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DIRECT SEEDING OF WESTERN WHITE PINE USING POISONS FOR RODENT CONTROL[1]

Successful direct seeding of western white pine depends to a great extent upon effective control of seed-eating rodents. Direct seeding tests of this species by the Northern Rocky Mountain Forest and Range Experiment Station, assisted by the Northern Region Office of Planting of the Forest Service, indicate that effective control methods are at hand. Conical wire screens made from hardware cloth were found by Schopmeyer to be a simple and successful though rather expensive method of preventing seed sown in spots from being consumed by rodents.[2/3] More practical and less expensive is a poisoning method of control developed by the Wildlife Research Laboratory of the Fish and Wildlife Service and experimentally applied in the western white pine type by Schopmeyer.[4] This note gives results to date of four direct seeding tests of western white pine using the latter method for rodent control.

1/ By D. G. McKeever, Division of Silviculture.

2/ Schopmeyer, C. S. 1939. Direct seeding in the western white pine type. Applied forestry notes no. 90. Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana.

3/ Schopmeyer, C. S. 1940. Second-year results of direct seeding experiments in the western white pine type using screens for rodent control. Research note no. 6. Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana.

4/ Schopmeyer, C. S. 1940. Successful forestation by direct seeding using poisons for rodent control. Research note no. 1. Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana.

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Method of Rodent Control

The method of rodent control used on the four seedings reported here consisted of two steps: (1) ten to fourteen days before sowing, the selected area was poisoned with hulled sunflower seeds, treated with thallium sulfate, by distributing the poison-bait where rodents could readily find it in small piles at intervals of 15 to 20 feet under cover of down timber and other debris to protect seed-eating birds from it; (2) the pine seeds to be sown were coated a few days before sowing with a poisonous mixture[5] consisting of yellow dextrine, plaster of paris, cornmeal, and strychnine alkaloid.[6]

Description of Direct Seeding Tests

Two of the four areas were baited with poisoned sunflower seeds and sown with strychnine-coated white pine seeds in October 1938. One comprised 50 acres in the Kalispell Creek drainage of the Kaniksu National Forest, Washington, and the other included 11 acres on the Deception Creek Experimental Forest within the Coeur d'Alene National Forest, Idaho. Both areas had been clearcut in 1937 and broadcast burned in 1938 about a month before sowing. Detailed descriptions of the sites and seeding are included in Research Note No. 1.[7] Briefly it may be noted that the Kalispell Creek location is a flat bench with slightly podsolized sandy loam soil, and the Deception Creek location is a north-facing slope with silt loam soil. Prepoisoning on both areas was at the rate of one pound of poison bait per acre. The poisoned white pine seeds were sown in spots spaced 8 feet apart with approximately 20 seeds per spot covered with three-eighths inch of mineral soil.

5/ Briefly mentioned later in this note are experiments which indicate that this secondary poisoning treatment is unnecessary when the prepoisoning treatment is used. Under some conditions the coated pine seeds lose their viability, which has led the Fish and Wildlife Service to withhold recommendations for poison coating of pine seed until further studies have been made.

6/ Warning: Thallium sulfate and strychnine alkaloid are dangerous poisons and should not be handled except according to specific instructions; formulae for mixing the above poisons and directions for their use are available upon special application to the Fish and Wildlife Service.

7/ See footnote 4.

Another of the tests, 20 acres in area, is located on a rather steep northerly slope of Pable Creek, a tributary of Kalispell Creek, Kaniksu National Forest. The area was logged over for pine several years ago and the residual stand of defective trees was felled during the winter of 1938-39 preparatory to broadcast burning. Burning occurred unexpectedly when the area was overrun and burned quite clean to the granitic sandy loam soil by the Gleason Mountain fire of August 1939. The 20 acres were prepoisoned and seeded in late October 1939 following methods used on the Kalispell Creek and Deception Creek areas.

In the North Fork of the Coeur d'Alene River drainage near Honey Creek, Coeur d'Alene National Forest, 97 acres were prepoisoned and seeded with strychnine-coated white pine seed in October 1940. Defective hemlock and grand fir, left on the area after logging, had been felled and broadcast burned in September 1939. Slopes in general face north and east, but two steep draws provide small areas of south and west exposures. Soil is silt loam without much rock. Vegetation, consisting mostly of fireweed and thimbleberry, partially cloaked the area at the time of sowing and by the end of the first growing season the ground was covered with a dense growth of these plants.

This Honey Creek job was administratively handled the same as a regular planting job using CCC labor. At approximately 20-foot intervals poison-treated sunflower seeds were distributed at the rate of one-half pound per acre. Poisoned western white pine seeds were sown in spots spaced 7½ feet apart or 770 spots per acre. Spots were prepared with hazel hoes by scraping away debris and ashes to expose a patch of mineral soil about 12 inches in diameter. The equivalent of 81 pounds of uncoated seed was used, or an average of 0.84 pound per acre. At 25,000 seeds per pound and 770 spots per acre, the average number of seeds per spot was 27 although the crews had been instructed to sow 15 to 20 per spot.8/

Twelve systematically distributed sample plots of 25 spots each, or 300 spots, on the Kalispell Creek site and nine similar plots, or 225 spots, on the Deception Creek and Pable Creek sites were used to count seedlings. On the

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8/ The tendency to sow more seeds than necessary, a common failing among CCC crews, can be overcome by using a spoon cut to hold the number of seeds desired, although such a measuring device slows up the work somewhat.

Honey Creek project seedling counts were made by examining 400 spots on two staked rows transversing the 97 acres.

Results of Tests

Germination and survival on the four areas are listed in table 1. In this table "stocked spots" means the number of spots which had one or more live seedlings, expressed as a percentage of the total number examined. Under "seedlings per stocked spot" the average number of seedlings per spot for all the stocked spots is listed.

Table 1.--Germination and survival on four western white pine seeded areas

Location	Germination		Survival					
			First year		Second year		Third year	
	Stocked spots	Seedlings per stocked spot	Stocked spots	Seedlings per stocked spot	Stocked spots	Seedlings per stocked spot	Stocked spots	Seedlings per stocked spot
	Percent	No.	Percent	No.	Percent	No.	Percent	No.
Kalispell Creek	76	3.5	68	3.1	70 1/	3.2	68	3.3
Deception Creek	93	4.8	85	4.2	82	4.2	80	3.8
Pable Creek	71	4.6	63	3.6	67 1/	4.2		
Honey Creek	78	2.5	61	2.2				

1/ Increase due to additional germination the second year.

Dormancy and delayed germination are characteristic of white pine seed. For this reason best results are secured from fall sowing. Frequently, however, germination is not complete in a single year and additional germination occurs the second season from seeds which have lain dormant in the soil. This was the case with the Kalispell Creek and Pable Creek seedings. Additional germination in the spring of the second year brought the total of spots with germinated seed to 84 percent on the Kalispell Creek area and 77 percent on the Pable Creek seeding. As shown in table 1, survival at the end of the second growing season was 70 percent and 67 percent, respectively, 2 percent and 4 percent better than at the end of the first year.

Most of the loss after germination on the Honey Creek area occurred on the south and west exposures where insolation and soil moisture probably were critical.

Cost records on the seeding of the Kalispell Creek project charge $7.83 per acre for materials, labor, and supervision plus $1.50 for overhead to make experimental seeding costs comparable with administrative planting costs, for a total cost of $9.33 per acre. Average total cost of planting in the northern Rocky Mountain region during 1938 was $13.13 per acre. Seeding cost on one 50-acre area, therefore, was 71 percent of the average regional cost of planting.9/

Cost records of the Honey Creek project show a total cost of $9.38 per acre. Average planting cost for the Coeur d'Alene Forest in 1940 on 779 acres was $17.33 per acre and the average cost on 10,490 acres in the northern Rocky Mountain region during 1940 was $13.01 per acre. Using these costs, the Honey Creek seeding was accomplished for 54 percent of the cost of planting on the same forest and 72 percent of the average cost of planting in the region.

Unpublished results of other experiments have indicated that when only the prepoisoning treatment is used approximately the same success is secured as when both prepoisoning and poisoned seed are employed. If this proves to be true when applied administratively, the cost of seeding can be reduced by the cost of coating pine seed with poison, or by nearly $1 per acre.

In other parts of the country oat-groats when treated with prescribed poison have been cheaper and equally as satisfactory as poisoned sunflower seed for a bait to eradicate rodents. If, when tested here, poisoned oat-groats make a successful medium for eliminating seed-eating rodents on areas to be seeded, further savings should be possible in the cost of applying direct seeding.

Summary

Four areas, 11, 20, 50, and 97 acres in size, all on selected good sites in northern Idaho, have been direct seeded with western white pine using a poisoning method for rodent control developed by the Fish and Wildlife Service. Third-year survivals of seedlings on the 11- and 50-acre areas, seeded in October 1938, were 80 and 68 percent, respectively. Second-year survival on the 20-acre area, seeded in late October 1939,

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9/ See footnote 4.

was 67 percent, and first-year survival on 97 acres seeded in October 1940 was 61 percent. The promising results from these tests indicate that large-scale sowings of this species on the better sites can be a practical and economical method of establishing reproduction. Additional experiments in direct seeding to reduce its cost, simplify its application, broaden its scope, and define its limitations are needed.